2.9.4. Wastewater Systems

A. Determination of Wastewater Flow

1. Residential single-family units shall be assumed to produce an average wastewater flow of 245 gallons/day.

2. Industrial wastewater flows will be evaluated on a case-by-case basis.

3. Inflow/Infiltration.

In sizing sewers, external contributions are accounted for by including 750 gallons per day per acre served for inflow and infiltration. For sewers in the Edwards Aquifer Zone refer to the Texas Commission on Environmental Quality (TCEQ) requirements. Strict attention shall be given to minimizing inflow and infiltration.

4. Peak Dry Weather Flow.

The peak dry weather flow is derived from the formula:

$$Qpd = [(18+(0.0206 \times F)^{0.5}) / (4+(0.0206 \times F)^{0.5})] \times F$$

where: F = 70 gal./person/day x population/1440

= average dry-weather flow in gpm

5. Peak Wet Weather Flow.

The peak wet weather flow is obtained by adding inflow and infiltration to the peak dry weather flow. In designing for an existing facility, flow measurement shall be used in lieu of calculations for the preexisting developed area.

B. Determination of Pipe Size

1. Minimum Size.

The minimum diameter of all gravity sewer mains shall be eight (8) inches. For service line sizes, refer to the City of Austin Standard Details.

2. Design Requirements.

For sewer mains, fifteen (15) inches in diameter or smaller, use the larger size as determined below:

a. The main shall be designed such that the Peak Dry Weather Flow shall not exceed 65% of the capacity of the pipe flowing full.

b. The main shall be designed such that the Peak Wet Weather Flow shall not exceed 85% of the capacity of the pipe flowing full.

c. For sewer mains, eighteen (18) inches in diameter or larger, the main shall be designed such that the peak Wet Weather Flow shall not exceed 80% of the capacity of the pipe flowing full.

3. Design Velocities.

The minimum design velocity calculated using the Peak Dry Weather Flow shall not be less than two (2) feet per second (fps). The maximum design velocity calculated using the Peak Wet Weather Flow should not exceed ten (10) fps. Velocities in excess of 10 fps may be considered under special conditions where no other options are available. In such cases, proper consideration shall be given to pipe material, abrasive characteristics of the wastewater flows, turbulence and displacement by erosion or shock.

4. Minimum Slope.

The minimum allowable slope for eight (8) inches mains within the service area of the City of Austin shall be 0.005 ft./ft (0.5 percent grade).

5. Allowable pipe sizes.

The following sizes will be the only sizes allowed for use in the gravity system: 6" (for services only), 8", 12", 15", 18", 21", 24", 30" 36", 42". Larger sizes may be approved on a case by case basis.

C. Design Considerations

1. Materials and Standards.

All materials and appurtenances shall conform to the City of Austin Standard Products List.

2. Protecting Public Water Supply.

No physical connection shall be made between a drinking water supply and a sewer or any appurtenance thereof. An air gap of a minimum of two inlet pipe diameters between the potable water supply and the overflow level connected to the sewer shall be provided.

3. Location.

The location of the wastewater main shall be in conformance with the City of Austin Standard Details Manual. Alternative assignments must be approved by Pipeline

Engineering. Outside the City Limits, the design engineer shall coordinate utility assignments with both the Austin Water Utility and the appropriate county authority.

4. Separation Distance.

The separation between wastewater mains and other utilities shall be in accordance with the Rules adopted by the Texas Commission on Environmental Quality.

5. Steep grades.

Where the pipe grade exceeds 12% and the construction is outside of any pavement, concrete retards conforming to the City standards will be required at intervals of no more than twenty-five (25) feet (preferably at joint locations).

6. Depth of Cover.

The minimum depth of cover over the upper-most projection of the main shall be as follows:

a. Wastewater piping installed in natural ground in easements or other undeveloped areas which are not within existing or planned streets, roads or other traffic areas, shall be laid with at least 42 inches of cover.

b. Wastewater piping installed in existing streets, roads or other traffic areas shall be laid with at least 66 inches of cover.

c. Wastewater piping installed in proposed streets shall be laid with at least 48 inches of cover below the actual subgrade. The maximum depth shall be as approved by the Utility for the specific material, application, and conditions.

7. Turbulence.

Wastewater lines shall be designed to minimize turbulence to prevent release of sulfide gases and subsequent corrosion.

8. Wastewater lines are prohibited in a critical water quality zone, except for a necessary crossing. (see the Code of the City of Austin, 25-8-361).

9. Curved wastewater mains are prohibited.

D. Manholes

1. Location.

Manholes shall be located and spaced so as to facilitate inspection and maintenance of the wastewater main. All manholes must be accessible to maintenance equipment,

including 2½ ton straight trucks, dump trucks, vacuum trucks, and standard (not compact) sizes of backhoes and loaders. Manholes shall be placed at the following locations:

a. Intersections of mains.

b. Horizontal alignment changes.

c. Vertical grade changes.

d. Change of pipe size.

e. Change of pipe material.

f. The point of discharge of a force main into a gravity wastewater main.

g. Intersection of service lines to main lines 24 inches and larger.

h. A manhole is required at the point of connection of a building service line to the public wastewater service stub for multi-family projects exceeding fifteen (15) dwelling units and for commercial developments {containing more than 4,000 square feet} requiring a water meter greater than 2".

i. At the upstream end of mains.

j. At other locations as required by Chapter 15-10 (Wastewater Regulations) of the Austin City Code.

2. Spacing.

Manhole spacing for lines smaller than 24 inches should not exceed 500 ft.; for larger mains, spacing may be increased, subject to approval by the Utility.

3. Covers.

All manholes not located in paved areas shall have bolted, watertight covers.

4. Corrosion Prevention.

Manholes shall be constructed of or lined with a corrosion resistant material. Where new construction ties into an existing manhole, the existing manholes must be lined, coated, or replaced with a corrosion resistant material.

5. All lines into manholes, including drop connections, shall match crown-to-crown where feasible. Any deviation must be approved in advance by Pipeline Engineering.

6. Drop manholes will have a maximum of 8 foot of drop and are not allowed where the main size exceeds 15 inches.

7. Minimum inside manhole diameters shall be as indicated in the following table:

	Depth		
Main Size	Less than 20’	20’ – 30’	Greater than 30’
Up to 15”	48”	60”	72”
18”-24”	60”	60”	72”
30” & 36”	72”	72”	72”

Note 1: In the event a structure is utilized inside a manhole, the clear space between the structure and the manhole wall shall be a minimum of 48”.

Note 2: If more than two pipes connect to a manhole, or if two pipes connect to a manhole at an angle other than 180 degrees from each other, larger diameters may be required in order to accommodate mandrel insertion and hydraulically efficient flow.

Note 3: Access to mains ~~48”~~ ***42”*** and larger shall be by junction boxes designed by a structural engineer.

Note 4: New pipe connections to existing manholes shall provide a minimum of 12” clearance between the existing pipe ID and the new core hole ID measured on the inside surface of the manhole, regardless of the orientation of the pipes with respect to one another. New precast manholes shall have holes for pipe penetrations separated far enough apart to ensure the structural integrity of the manhole wall.

8. Where a separation of nine feet between a water main and a manhole cannot be achieved, as approved by the Austin Water Utility, the joints in the wastewater manhole shall be made watertight using externally applied joint wraps.

9. All manhole bases, for manholes to be constructed on existing lines, shall be cast in place.

10. Manhole and junction box inverts shall have a minimum slope of 2.5% between the inlet and outlet pipe inverts or have a minimum difference of 0.10 feet between the inlet and out pipe inverts, whichever provides the maximum difference in invert elevation between the inlet and outlet pipes.

11. Manholes and junction boxes located below ground water

a. When the interior surface of a concrete manhole or junction box is coated with a urethane, polyurethane, or epoxy liner, the exterior surface of that portion of a manhole or junction box located below ground water level shall be water proofed using a flexible system applied to the exterior surface. The drawings shall indicate which structures must be water proofed and the elevation to which water proofing must be applied (2 feet above ground water level).

b. Manhole joints below the ground water level shall be sealed by installing a joint wrap material over the joint on the manhole exterior.

c. Construction joints in cast-in-place junction boxes shall be water proofed using water stops.

E. Ventilation

Ventilation shall be provided as required by TCEQ Rules and Regulations.

F. Inverted Siphons

Siphons shall have a minimum of two barrels. The minimum pipe size shall be six (6) inches with a minimum flow velocity of 3.0 fps at peak dry weather flow. The minimum dry weather flow shall be used to size the smallest barrel. Three-barrel siphons shall be designed to carry the capacity of the incoming gravity wastewater mains(s) with one barrel out of service.

An additional corrosion resistant pipe shall be designed to allow for the free flow of air between the inlet and outlet siphon boxes. The diameter of this air jumper shall not be smaller than one-half the diameter of the upstream sewer. Air jumper pipe design shall provide for removal of condensate water that will collect in the pipe.

Siphon inlet and outlet structures shall be manufactured with approved corrosion resistant material and shall provide for siphon cleaning and maintenance requirements.

G. Service Lines

1. Wastewater service lines, between the main and property line, shall have an inside diameter not less than six (6) inches. The minimum grade allowed for service lines is one (1) percent. In all new systems, grade breaks exceeding allowable joint deflection must be made with approved fittings and shall not exceed a cumulative total of 45 degrees. No service connections shall be made to mains larger than 15 inches in diameter.

2. Usually wastewater services are placed along the common property line between two lots where there is no conflict with other utilities' services. All other Utility service is usually located at the other lot corner. Wastewater service should be placed four (4) feet on the low (or right, if on a level ground) side of the lot, nine (9) feet from the water service (located on the other side of the lot line). Services to lots without a

water/wastewater easement will terminate at the property line with a cleanout; service to lots having a five (5) foot by five (5) foot water/wastewater easement will terminate within the easement. For details, see the City of Austin Standard Details.

3. Wastewater clean-outs are not allowed in sidewalks or driveways.

4. Large Diameter Cleanouts are required for service lines that are 8"in diameter and when Industrial waste monitoring is required. They shall be located at the property line on the Public ROW side or at the easement line to indicate the line of responsibility of the utility. They shall not be located in traffic areas, paved parking areas or sidewalks.

5. Manholes are required for services larger than 8"in diameter. They shall be located at the property line on the Public ROW side or at the easement line to indicate the line of responsibility of the utility.

H. Easements

1. Easements for wastewater mains shall be a minimum of 15 feet wide, or twice the depth of the main, measured from finished grade to pipe flowline, whichever is greater. Mains shall be centered on the easement. Narrower easements will be considered where the Engineer provides evidence, to the satisfaction of AWU, that maintenance activities will not be hindered by the reduced width.

2. Easement documents and the metes and bounds shall be reviewed and approved by AWU Pipeline Engineering prior to recordation with the County. Easement recordation by the County is required prior to AWU approval of construction plans.

I. Requirements for Existing and Proposed Wastewater Infrastructure in Roundabouts or Traffic Circles

1. Requirements for a proposed roundabout or traffic circle intersection design with existing wastewater infrastructures.

Existing wastewater infrastructure shall be relocated around the outside of the roundabouts or traffic circle islands. If they are not able to be relocated, they may remain within/under the roundabout or traffic circle island as long as they are steel encased with split steel encasement, subject to approval by AWU. Trees and permanent structures, including appurtenances such as manholes, wyes, etc., shall be prohibited within the roundabout and traffic circle island when existing wastewater infrastructures remain. All the appurtenances must be relocated to accommodate sleeving of the mains

2. Requirements for a proposed roundabout or traffic circle intersection design in new areas of development with no existing wastewater infrastructures.

Wastewater infrastructures shall be prohibited from being located within/under roundabouts or traffic circle islands in developments and must comply with current State and Local criteria.